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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/641,589	08/18/2000	Philip A. Cooper	11910-002001	6655
26161	7590	02/01/2005	EXAMINER	
FISH & RICHARDSON PC 225 FRANKLIN ST BOSTON, MA 02110			BORLINGHAUS, JASON M	
			ART UNIT	PAPER NUMBER
			3628	

DATE MAILED: 02/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/641,589

Applicant(s)

COOPER ET AL.

Examiner

Jason M. Borlinghaus

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/15/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,8-11 and 27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,8-11, 27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/18/00</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: enclosure of appendix is improper. An appendix is limited to enclosure of a sequence listing table or a computer program listing (see MPEP § 608.05). Otherwise, information contained within the appendix should be incorporated into the specification or filed through an IDS.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 – 3 and 8 - 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Shlafman (US Patent Pub. 2002/0065755 A1).

Regarding Claim 1, Shlafman discloses a machine-based method comprising:

- receiving data representing current prices of options on a given asset
("Typically, processor receives as input information regarding trends governing the behavior of a certain asset, preferably along with a group of other related assets and/or other variables...Alternatively or additionally, processor may be programmed to extract trend and variance

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characteristics from raw data regarding the asset itself and other related factors.” – see paragraph 0042),

- by machine, performing computations to derive from said data an estimate of a corresponding implied probability distribution of the price of said asset at a future time (“A method for trading in a financial derivative of an underlying asset includes determining a trend predictive of a future value of the asset and a predicted variance of the future value. Responsive to the trend and the variance, a density function is calculated, which is indicative of a probability distribution of the value at a first time in the future.” – see abstract), and
- making information about said probability distribution available within a time frame that is useful to investors (“...a trading decision is made with regard to the derivative of the asset based on the density function.” – see abstract).

Regarding Claim 2, Shalfman discloses a method in which the data represent a finite number of prices of options at spaced-apart strike prices of the asset, and also including:

- calculating a set of first differences of said finite number of prices to form an estimate of the cumulative probability distribution of the price of said asset at a future time (see equation 10, paragraph 0056).

Regarding Claim 3, Shalfman discloses a method also including:

- calculating a set of second differences of the finite number of strike prices from the set of first differences to form an estimate of the probability distribution function of the price of said asset at a future time (see equation 21, paragraph 0078).

Regarding Claim 8, Shalfman discloses a machine-based method comprising:

- receiving data representing current prices of options on a given asset, the options being associated with spaced-apart strike prices of the asset at a future time (“Typically, processor receives as input information regarding trends governing the behavior of a certain asset, preferably along with a group of other related assets and/or other variables...Alternatively or additionally, processor may be programmed to extract trend and variance characteristics from raw data regarding the asset itself and other related factors.” – see paragraph 0042),
- the data including shifted current prices of options resulting from a shifted underlying price of the asset, the amount by which the asset price has shifted being different from the amount by which the strike prices (grid points) are spaced apart, (“Additionally or alternatively, integrating the density function includes computing an integrated value of the function at each of a plurality of grid points in a coordinate space, wherein the value of the asset is represented by a coordinate in the space.” – see paragraph 0026). (“Alternatively or additionally, recalculating the density function includes interpolating the density function intermediate the grid points so

as generate a smooth function over a selected range of calculation.” – see paragraph 0027), and

- by machine, performing computations to derive from said data an estimate of a quantized implied probability distribution of the price of said asset at a future time, the elements of the quantized probability distribution being more finely spaced (interpolating) than for a probability distribution derived without the shifted current price data. (“A method for trading in a financial derivative of an underlying asset includes determining a trend predictive of a future value of the asset and a predicted variance of the future value. Responsive to the trend and the variance, a density function is calculated, which is indicative of a probability distribution of the value at a first time in the future.” – see abstract). (“Alternatively or additionally, recalculating the density function includes interpolating the density function intermediate the grid points so as generate a smooth function over a selected range of calculation. Preferably, computing the integrated value includes computing the value and a first derivative of the density function at the second time, and interpolating the density function includes fitting polynomial functions between the grid points so as to match the value and the first derivative of the density function computed at each of the grid points. – see paragraph 0027).

Regarding Claim 9, Shlafman discloses a machine-based method comprising:

- receiving data representing current prices of options on a given asset, the options being associated with spaced-apart strike prices of the asset at a future time (“Typically, processor receives as input information regarding trends governing the behavior of a certain asset, preferably along with a group of other related assets and/or other variables...Alternatively or additionally, processor may be programmed to extract trend and variance characteristics from raw data regarding the asset itself and other related factors.” – see paragraph 0042),
- by machine, performing computations to derive from said data an estimate of a implied probability distribution of the price of said asset at a future time, the mathematical derivation including a smoothing operation (“A method for trading in a financial derivative of an underlying asset includes determining a trend predictive of a future value of the asset and a predicted variance of the future value. Responsive to the trend and the variance, a density function is calculated, which is indicative of a probability distribution of the value at a first time in the future.” – see abstract) (“40. A product according to claim 39, wherein the instructions further cause the computer to interpolate the density function intermediate the grid points so as generate a smooth function over a selected range of calculation.” – see Claim 40), and
- making information about said probability distribution available within a time frame that is useful to investors.

Regarding Claim 10, Shlafman discloses a method in which the smoothing operation is performed in a volatility domain. ("40. A product according to claim 39, wherein the instructions further cause the computer to interpolate the density function intermediate the grid points so as generate a smooth function over a selected range of calculation." – see Claim 40)

Regarding Claim 11, Shlafman discloses a method in which the smoothing operation is performed in the domain of the option prices or in the domain of the probability distribution. ("40. A product according to claim 39, wherein the instructions further cause the computer to interpolate the density function intermediate the grid points so as generate a smooth function over a selected range of calculation." – see Claim 40).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shalfman in view of Makivic (US Patent 6,061,622).

Shlafman discloses a method comprising:

- by machine, performing computations that use using Monte Carlo techniques to estimate a probability distribution of the value at a future time T of a portfolio that includes the option. ("Monte Carlo methods can be used to simulate the behavior of the underlying asset and/or derivative over time." – see paragraph 0011).

Shlafman does not teach a method comprising:

- defining a current value of an option as a quadratic expression that depends on the difference between the current price of the option and the current price of the underlying security.

Makivic discloses a method comprising:

- defining a current value of an option as a quadratic expression (quadratic trend – see col. 16, line 57) that depends on the difference between the current price of the option and the current price of the underlying security.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Shalfman by incorporating the definition of a current value of an option as a quadratic expression, as was done by Makivic to provide an additional source of analytical data to the system user.

Conclusion

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The reference cited to Recovering an Asset's Implied PDF from Option Prices: An Application to Crude Oil during the Gulf Crisis, William R. Melick and Charles P. Thomas, Journal of Financial and Quantitative Analysis, March 1997, vol. 32, no. 1, pp. 91 - 115, is considered to be relevant to the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Borlinghaus whose telephone number is (703) 308-9552. The examiner can normally be reached on 8:30am-5:00pm M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hyung Sough can be reached on (703) 308-0505. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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